

National Panasonic

RF-8000

FM-AM 24-Band Receiver

Operating Instructions

Bedienungsanleitung

Mode d'emploi

Instrucciones de operación

使用説明書

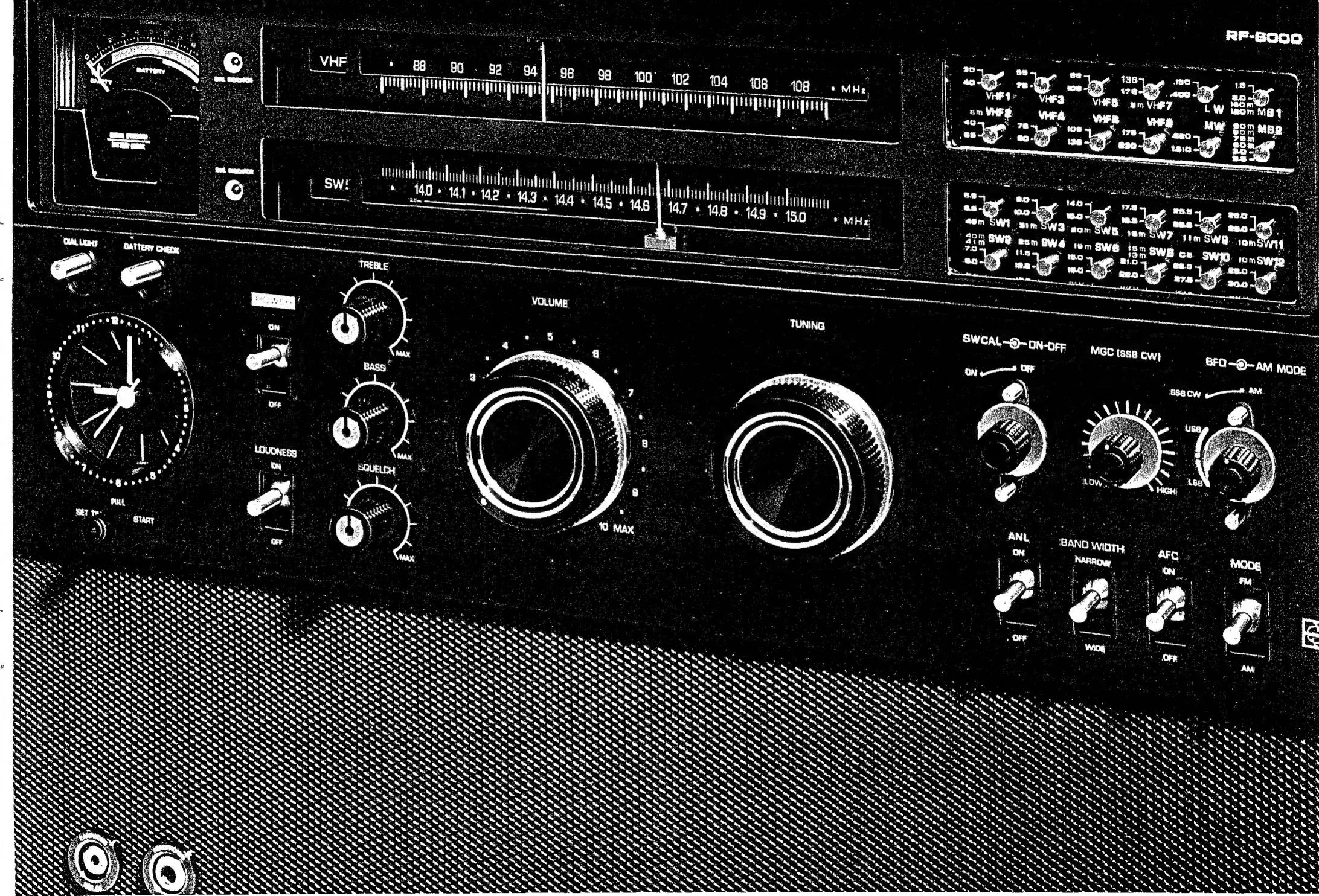
إرشادات الاستعمال



The sound of quality around the world

LAIRD PM-AM-SSB-CW RECEIVER

RF-8000



Muchas gracias por adquirir el RF-8000 de National Panasonic.

Este modelo ha recibido las pruebas de calidad más severas, considerándosela la radio mejor del mundo. Las últimas investigaciones en el diseño y tecnología han sido combinadas para ofrecerle a usted en cualquier respecto una inigualada satisfacción.

Este es un aparato de alta sensibilidad de un funcionamiento y calidad de sonido maravillosos. Permite, además, la recepción de muchas señales, imposibles de captar con radios ordinarias.

Lea por favor este librito de instrucciones cuidadosamente antes de poner en marcha el RF-8000.

致謝閣下購用此National Panasonic RF-8000。

此接收器為世界品質最優秀收音機，它會經受過最嚴格的檢驗。此接收器配合最新發展的技術及設計，以提供閣下在各方面無比倫的享受滿足。

靈敏度高，擁有優越的性能和音質，並可接收到普通收音機所不能接收到的各種訊號。

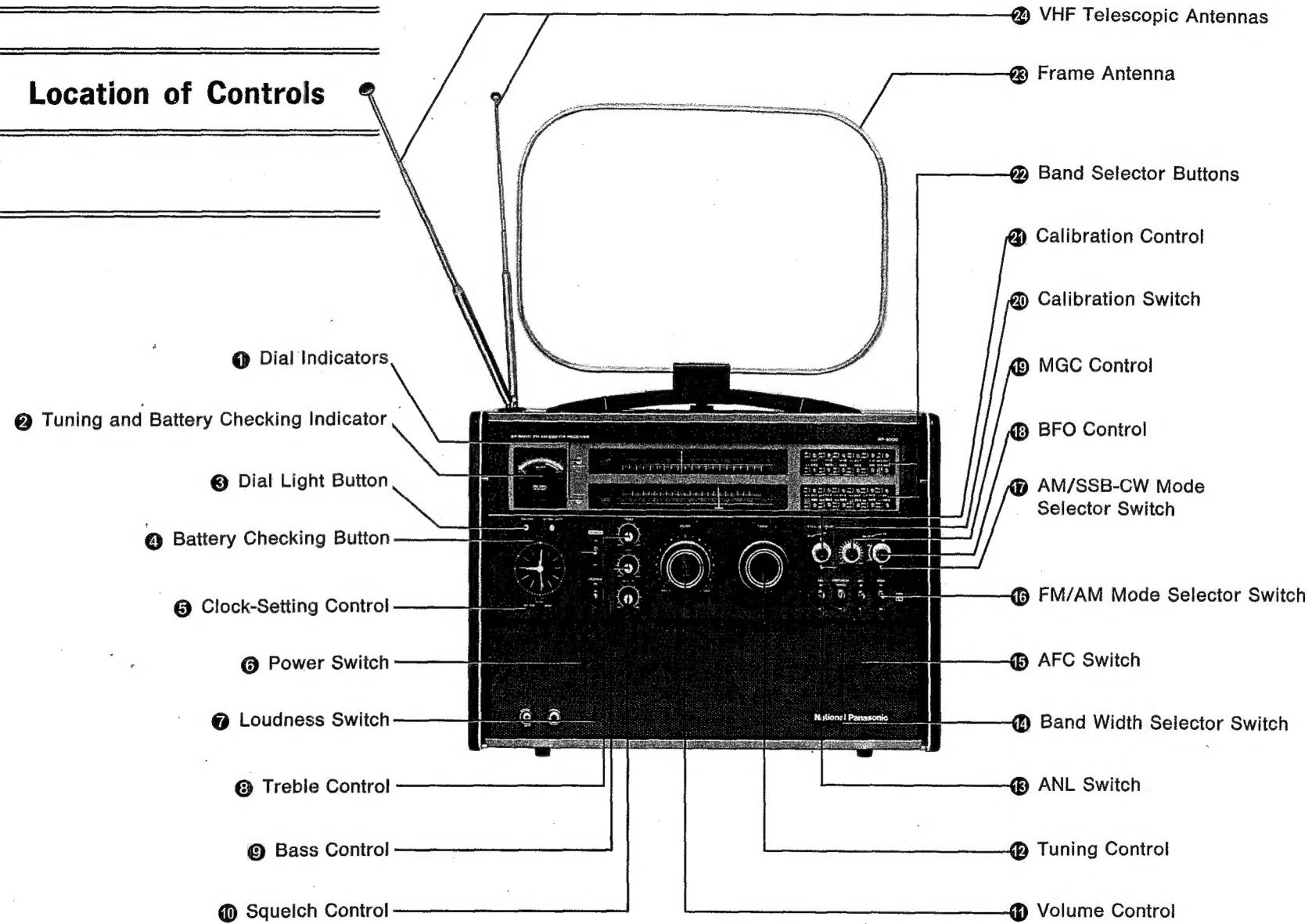
請在使用本機前，詳閱此說明書。

شكراً على إنتقاءكِ موديل RF-8000 هذا وكأفضل راديو في العالم، من هذا الجهاز خلال خصوص دقة لضمان الجودة. ولقد شمل تصميمه على آخر التطورات الفنية والتكنولوجية لأعطال كل ما تزيد عن على الرadio.

وبسبب حساستيته العالية فإنه يركز في الإذاعات فجودة الصوت، سائلاً كل بأسلام إشارات عديدة التي لا يمكن استلامها من الرadios الاعتيادية.

رجاء قراءة هذه الارشادات بدقة قبل إستعمال الجهاز

Location of Controls



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Features

- 24-Band, highly sensitive receiver: Long Wave, Medium Wave, Marine Bands, Short Waves and Very High Frequency bands.
- Full broadcast-frequency coverage from 150 kHz to 230 MHz.
- Receives all Frequency Modulated (FM), Amplitude Modulated (AM), SSB and CW signals.
- Full coverage of all TV sound frequencies (VHF) in the world.
- Precise DC motors coupled with electronic control circuit make up an auto-one-touch band selecting system.
- Crystal-controlled double-super-heterodyne circuitry give very high sensitivity, selectivity and frequency stability on the Short Waves and the Very High Frequency bands.
- The dial can be scaled using the 500 kHz crystal marker oscillator, and the dial/pointer setting error can be corrected (short waves only).

National Panasonic

FM-AM 24-Band Receiver

RF-8000

Thank you for purchasing the National Panasonic RF-8000.

As the world's best quality radio, it has passed through the severest quality checks. The latest developments in design and technology have been combined to give you unmatched satisfaction in every respect.

Highly sensitive, it excels in performance and sound quality and permits reception of many signals that are not receivable on ordinary radios.

Please read this instruction booklet carefully before operating the RF-8000.

Wir danken Ihnen für den Kauf des National Panasonic RF-8000.

Als das beste Qualitätsradio in der Welt, ging es durch die strengsten Qualitätskontrollen. Die neuersten Entwicklungen in Gestaltung und Technik wurden vereinigt um Ihnen unvergleichliche Zufriedenstellung in jeder Hinsicht zu geben. Höchst empfindlich und sich in Leistung und Tonqualität auszeichnent erlaubt es den Empfang von vielen Signalen, die mit normalen Radios nicht empfangen werden können.

Bitte lesen Sie dieses Anleitungsbüchlein genau durch, bevor Sie den RF-8000 in Betrieb setzen.

Merci pour avoir choisi la RF-8000 de National Panasonic.

La radio de la meilleure qualité du monde, elle a subi des contrôles extrêmement sévères. Les derniers perfectionnements en matière de présentation et de technologie ont été combinés de manière à vous procurer une satisfaction inégalée sous tous aspects.

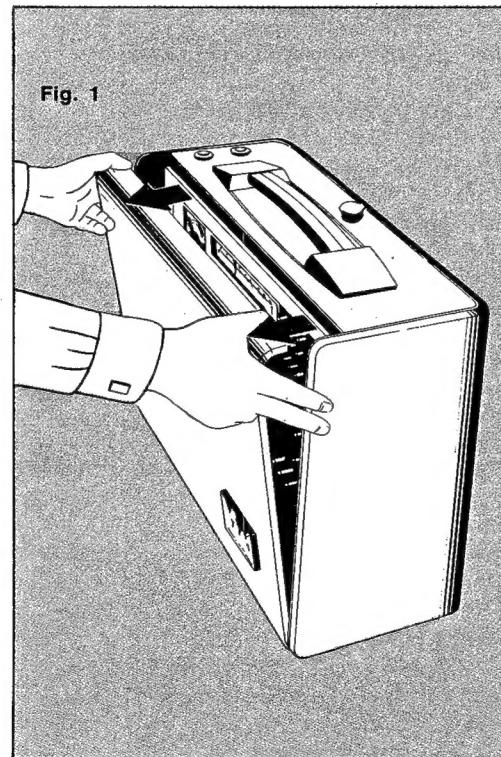
Hautement sensible, elle excelle par son rendement et sa qualité sonore, et permet la réception de nombreux signaux que les radios ordinaires ne peuvent capter.

Ne manquez pas de lire ce mode d'emploi avec soin avant de mettre en marche la RF-8000.

How to Open the Front Cover

- Product detection circuit for SSB and CW.
- Linear frequency dial scale (short waves only).
- Ladder-type ceramic filter for high selectivity.
- 3-way power source operation.
- DC clock with tuning fork mechanism.
- MGC circuit.
- BFO pitch control circuit.
- Loudness control circuit.
- Squelch control circuit.
- Separate bass and treble control circuits.
- FM/AM mode selector switch.
- Band width selector switch.
- ANL switch.
- AFC switch.
- Large tuning and battery checking indicator.
- Drum-type, large dials.
- Fly-wheel tuning for easier operation.
- Delicate gear and rope driven dial mechanism.
- Soft dial illumination.
- Dial Indicators.
- Rotatable frame antenna.
- Two long telescopic antennas for VHF.
- External antenna and earth terminals.
- World time-conversion plate and time-difference map.
- Easy carrying handle.

Disconnect the cover by pulling with both hands the top left and right hand corners toward you, as shown in Fig. 1.



Notes for Safe Use

■ Power Source Voltage

Adjust the voltage to the proper voltage in your area. POWER SOURCES OTHER THAN THE RATED VOLTAGE ARE EXTREMELY DANGEROUS!

■ Power Source Cord

Cuts, scratches and poor connection in the cord may cause fire or electric shock. Avoid bending, pulling or splicing the cord. Consult qualified repair shops if damage to the cord is detected.

■ Plugging and unplugging at the power source

Never use wet hands to plug or unplug the cord. Always hold the plug itself; do not pull on the cord to unplug.

■ Placement of the unit

Avoid places that are wet and humid. Do not use the power source in a bathroom. Do not place the unit in direct sunlight, in tightly closed cars, near heating appliances or near hot air blowers; the cabinet and internal parts may be adversely affected.

Power Supply

■ Do not insert metal objects in the unit

Do not insert metal objects inside the unit such as hairpins and coins, and keep the unit out of the reach of children.

■ Others

Clean the unit with a damp cloth only. Do not use chemical solvents of any kind since they may cause damage to the cabinet.

To prevent damage from battery leakage, remove the eight dry batteries when the set is not used or is powered by AC current or car battery over a period of two weeks or more.

■ Even if power switch is OFF, some parts of unit still have line voltage. Be sure to pull off the AC power cord before taking off.

Även om strömbrytaren är i "OFF"-läge, har fortfarande en del av apparaten nätspänning. Kontrollera att ni tar ut nätsladden ur vägguttaget innan ni tar bort bakstycket.

This unit offers 3-way power source operation: dry batteries, AC current and car battery.

■ Dry Battery Operation

• For the Radio

- 1) Open the battery compartment cover by rotating the two screws on the back panel counter-clockwise along the arrow marked "OPEN". (Fig. 2)
- 2) Insert eight dry batteries ("D" size, National UM-1 or equivalent) into the two battery tubes, making sure to observe correct polarity (+, -), as shown in Fig. 3. Place the two tubes over the tape with the - side pushing against the spring in the battery compartment as shown in Fig. 4. When removing the tubes, simply pull the tape.

• For the Clock

Insert one dry battery ("D" size, National UM-1 or equivalent) in the battery compartment as shown in Fig. 5. Observe correct polarity.

- Replace the battery compartment cover by rotating the screws clockwise along the arrow marked "CLOSE".

Note: Make sure to remove the eight batteries when the set is operated on AC current or car battery for a long period of time.

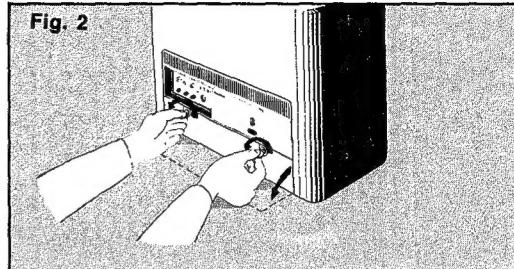


Fig. 2

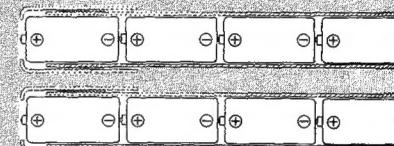


Fig. 3

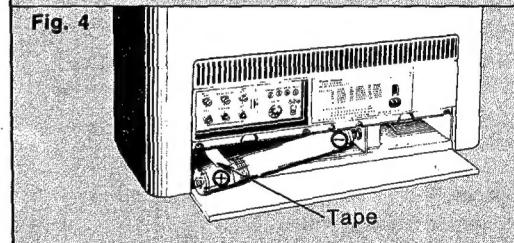


Fig. 4

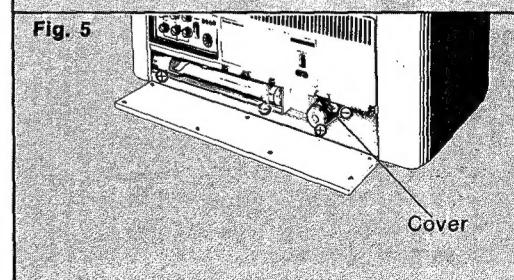
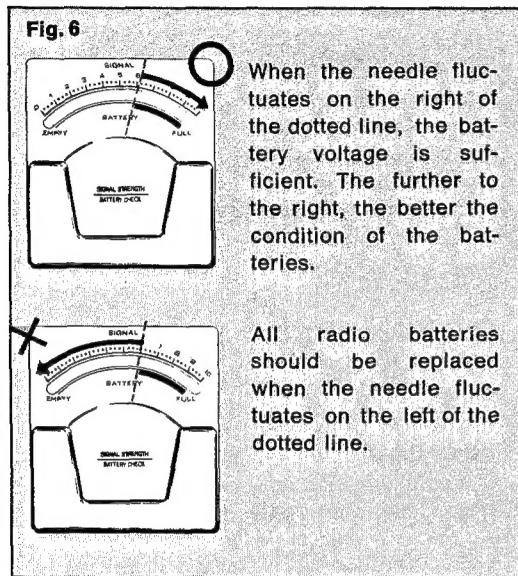


Fig. 5

• To check the dry battery condition

- 1) Switch the power switch **①** to the ON position.
- 2) Push the battery checking button **④**. Look at the tuning and battery checking indicator **②**. (Fig. 6)

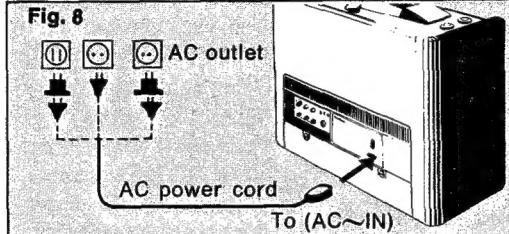
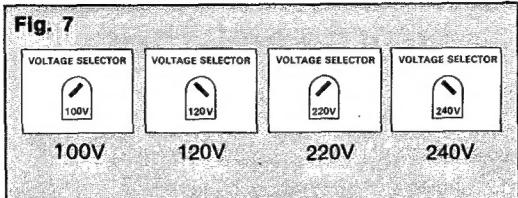
Note: This battery check is for radio batteries only. Clock's battery can not be checked.



When the needle fluctuates on the right of the dotted line, the battery voltage is sufficient. The further to the right, the better the condition of the batteries.

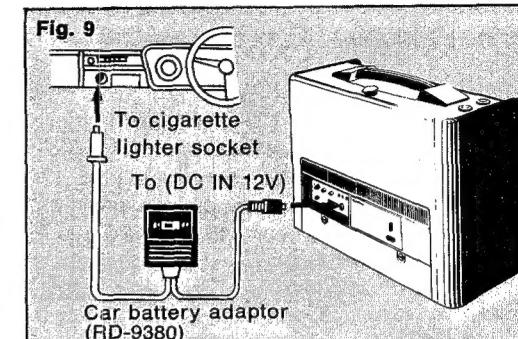
All radio batteries should be replaced when the needle fluctuates on the left of the dotted line.

- 2) Plug one end of the supplied AC power cord into the AC power source jack (AC~IN) and the other end into an AC outlet (Fig. 8). The unit will automatically disengage from battery operation and will operate on AC current.



E
Note 1: Make sure to disconnect the AC power cord from the set to obtain power from the car battery.

Note 2: When using the RD-9380 and depending on the model of the car, there is a possibility of noise. Be sure to check the noise conditions when purchasing it from a National Sales Agent.



Note 1: The plug adaptor is for use when the regular plug does not match the available AC outlet.

Note 2: To use battery power, the AC power cord must be disconnected from the jack on the radio; the batteries cannot be used if the cord is disconnected at the AC outlet only.

■ AC Power Operation

- 1) This unit has been preset to operate on 240V current. Be sure to check the voltage selector switch (VOLTAGE SELECTOR) located at the back of the unit to ascertain if the unit is set to the proper voltage corresponding to the voltage in your area. If the available voltage is other than 240V, adjust the voltage selector switch (VOLTAGE SELECTOR) with a screwdriver as shown in Fig. 7.

Four voltages can be used: 100V, 120V, 220V and 240V.

■ Car Battery Operation

- 1) National Panasonic car battery adaptor RD-9380 is sold separately. As in Fig. 9, connect the car battery through the cigarette lighter socket (DC 12V) and the unit's DC external power jack (DC IN 12V).
- 2) The internal batteries will be automatically disconnected.

Setting the Clock

As shown in Fig. 10, pull the clock-setting control ⑤ on the front panel, and set to the correct time. Upon releasing it, the clock will start to function. Note: The clock will not function without the battery for clock portion, even when AC current is being used and the clock dial is illuminated.

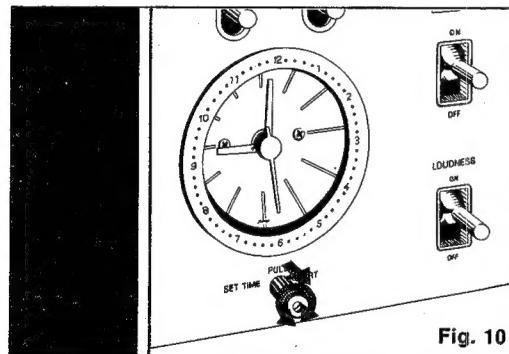


Fig. 10

Controls and Their Functions

① Dial Indicators (DIAL INDICATOR)

Indicate the broadcasting band being received; Very High Frequency bands (VHF1~VHF8), Long Wave (LW), Medium Wave (MW) and Marine Bands (MB1~MB2) are indicated and illuminated on the upper indicator. Short Wave bands (SW1~SW12) are illuminated on the lower indicator.

② Tuning and Battery Checking Indicator

It has two functions; to indicate tuning and to indicate the strength of the batteries.

- * As a tuning indicator; when turning the tuning control ⑫, the needle should fluctuate to the right as much as possible.
- * As a battery strength indicator; when pushing the battery checking button ④, the needle will fluctuate to the right when the batteries are satisfactory. (Details on page 8)

③ Dial Light Button (DIAL LIGHT)

Push this button when operating on dry batteries or car battery to illuminate the tuning and battery checking indicator ②, dial face and clock face. When using AC current, illumination is constant.

④ Battery Checking Button (BATTERY CHECK)

Push this button when checking battery strength. (Details on page 8)

⑤ Clock-Setting Control (SET TIME/START)

Set the time while pulling it.

⑥ Power Switch (POWER)

ON: To switch on.
OFF: To switch off.

⑦ Loudness Switch (LOUDNESS)

At the ON position, it correctly compensates for bass and treble when the volume is low.

⑧ Treble Control (TREBLE)

Controls the treble tone.

⑨ Bass Control (BASS)

Controls the bass tone.

⑩ Squelch Control (SQUELCH)

For tuning Very High Frequency (VHF) FM broadcasts or amateur band FM broadcasts. It eliminates inter-station noises or the noise that remains when the wireless amateur transmitter stops broadcasting. It should usually be set to the OFF position.

⑪ Volume Control (VOLUME)

For selecting the most desirable sound level.

⑫ Tuning Control (TUNING)

For selecting the desired broadcast.

⑯ ANL (Automatic Noise Limiter) Switch (ANL)

When this switch is set at the ON position, noises due to lightening, cars, etc. are cut out. It is effective during Very High Frequency (VHF) in AM mode, Long Wave (LW), Medium Wave (MW), Short Waves (SW) and Marine Bands (MB) broadcasts. It does not work for VHF in FM mode broadcasts.

⑰ Band Width Selector Switch (BAND WIDTH)

This switch should usually be set to the WIDE position. Sufficient sensitivity will provide Hi-Fi sound for listening pleasure. When there is an interfering signal, set it to the NARROW position. When listening to VHF4 and VHF5 bands, this switch has no effect.

⑯ AFC (Automatic Frequency Control) Switch (AFC)

This switch functions during VHF FM broadcasts to automatically lock the set on the correct frequency in case of frequency drift. It should usually be set to the ON position.

⑯ FM/AM Mode Selector Switch (MODE)

For selection of FM or AM broadcasts. Effective for VHF bands except VHF4 and VHF5.

⑰ AM/SSB-CW Mode Selector Switch (AM MODE)

Used for reception of SSB (Single-Sideband) or CW (Continuous Waves) signals. When listening to an ordinary broadcast, set it to the AM position.

⑱ BFO (Beat Frequency Oscillator) Control (BFO)

Used during reception of SSB or CW signals to clarify distorted SSB signals or to adjust the "click" sound of CW into a "peep" sound.

⑲ MGC (Manual Gain Control) Control (MGC)

Functions during reception of SSB or CW signals only. It usually should be set to the HIGH position.

⑳ Calibration Switch (OFF-ON)

㉑ Calibration Control (SW CAL)

Used to correct the dial scale during reception on Short Wave bands (SW1~SW12). Be sure to set the calibration switch ㉑ to the OFF position when not calibrating or during reception of signals other than short wave.

㉒ Band Selector Buttons

Automatically rotate the dial drums to the desired band (VHF1~VHF8, LW, MW, MB1~MB2 and SW1~SW12).

Note: Weak dry batteries will not have the power to rotate the dial drums. New batteries will be required.

㉓ Frame Antenna

For use during reception on MW, MB1~MB2 and SW1~SW12. (Details on page 11)

㉔ VHF Telescopic Antennas

For use during reception on VHF1~VHF8. (Details on page 11)

Antennas

Ferrite Core Antennas (Built-in)

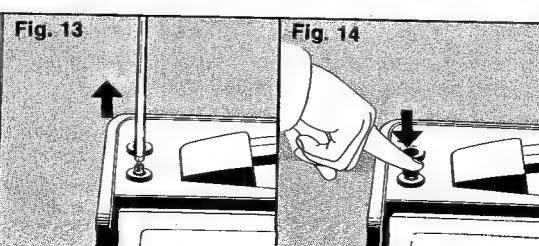
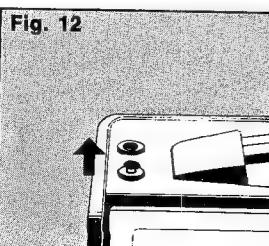
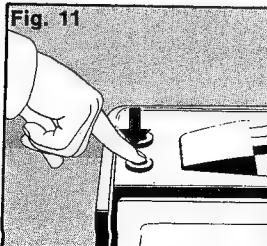
There is a special built-in ferrite core antenna for each band: LW, MW and MB1~MB2. These antennas are sufficient by themselves, but the frame antenna^② will further increase the sensitivity of reception when used together with the ferrite core antennas.

VHF Telescopic Antennas^①

These antennas are used only for reception on VHF1~VHF8 bands. They have no effect on LW, MW, MB1~MB2 and SW1~SW12 bands.

(How to Extend the Antennas)

- 1) Strongly push the heads of the two antennas. When you release your fingers, the lock will also be released and the antennas will pop up a little. (Fig. 11, 12)
 - 2) Pull the antennas out to their maximum length. (Fig. 13)
 - 3) When bringing down the antennas, push the heads until they lock in the frame (Fig. 14).
- Note: When bringing down the antennas, always start by pushing the thickest part first.



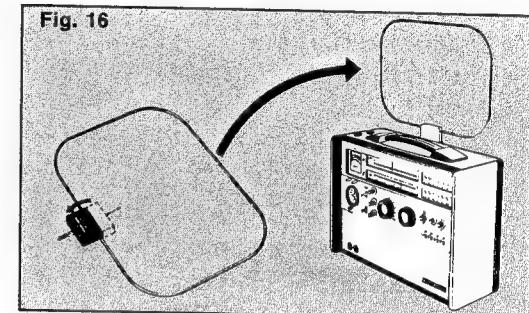
Frame Antenna^②

This antenna functions for MW, MB1~MB2 and SW1~SW12. It has no effect on LW or VHF reception.

(How to Fix It)

Remove it from the front cover and turn the plug part of the antenna (Fig. 16) to the outside. Then insert it into the frame antenna jack.

Fig. 16

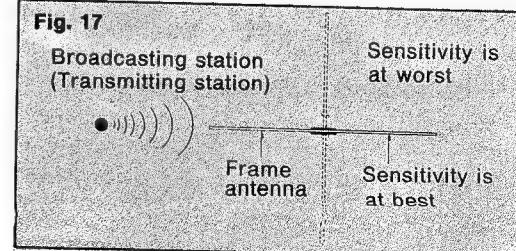


(Usage)

Slowly rotate the antenna a full 360° until the tuning and battery checking indicator^② needle fluctuates at the extreme right. For SW reception, align the antenna in the direction of propagation as in Fig. 17.

At MW and MB, the built-in ferrite core antennas may cause the frame antenna to deflect a little from the direction of propagation, or your signal may be jammed by interfering signals from stations with frequencies close to your frequency. To overcome or reduce this interference, turn the frame antenna a little.

Fig. 17



■ External Antenna/Earth

• For LW, MW, MB and SW

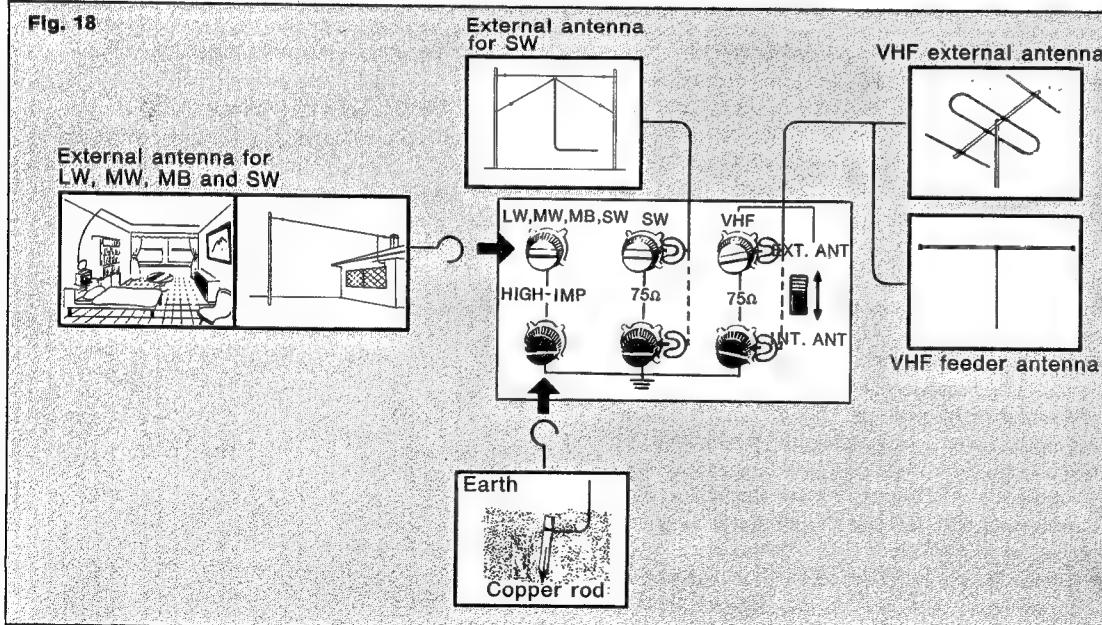
The frame antenna (for MW, MB and SW) and the built-in ferrite core antennas (for LW, MW and MB) are sufficient for listening pleasure on all bands. However, when reception is very difficult, as in Fig. 18, connect the external antenna to the unit's external antenna terminals and extend the antenna wire to a window. If noise continues, connect the earth wire to the unit's earth-terminal.

When listening to foreign broadcasts or distant stations, a fixed outdoor antenna may be necessary. In such a case, refer to page 19 for details.

• External Antenna for VHF Bands

The telescopic antennas for VHF1~VHF8 are sufficient. However, when listening to a weak broadcast, set the VHF antenna selector switch to the EXT. ANT. position and connect VHF external antenna or VHF feeder antenna as in Fig. 18. (Even though the antenna impedance is 75Ω , a 300Ω antenna can also be used).

Fig. 18



Notes on Long Wave (LW), Medium Wave (MW) and Marine Bands (MB) Reception

Frame Antenna ⑬

Adjust it in the direction most suitable for listening. If the reception conditions are not sufficient, connect an external antenna. (Details on page 19)

Note: During Long Wave (LW) broadcasting, this antenna has no effect.

Band Width Selector Switch ⑭

If reception is marred with interfering signals, set the switch to the NARROW position.

Notes on Short Waves (SW) Reception

Frame Antenna ⑬

Adjust it to the most suitable position. If reception conditions are unfavorable or when listening to foreign or distant broadcasts, connect an external antenna. (Details on page 19)

Band Width Selector Switch ⑭

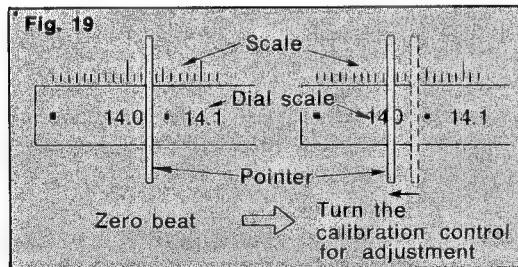
If interfering signals arise, set it to the NARROW position.

E**Calibration Switch ⑩****Calibration Control ⑪**

To check the dial/pointer setting error, use the following procedure;

- 1) Set the calibration switch ⑩ to the ON position.
 - 2) Set the dial pointer with the tuning control ⑫ to the extreme left, center or extreme right of the large calibrations on the scale in such a way as to get "zero beat" position (i.e., the mid-position between the two "peep" locations, where no "peep" sound can be heard).
 - 3) Turn the calibration control ⑪ until the pointer is at the extreme left, center or extreme right of the large calibrations. (Fig. 19)
 - 4) When adjustment is finished, set the calibration switch ⑩ to the OFF position.
- * Since "zero beat" is located at every multiple of 500 kHz, there are three checking points on the scale: Extreme left, center and extreme right.

Note: On MW, MB1 & 2, the beat sound can be heard but the dial scale cannot be calibrated.



Notes on Very High Frequency (VHF)

Reception

VHF Telescopic Antennas ⑬

Pull out the antennas to the optimum lengths. Adjust the directions and angles. If reception conditions are unfavorable, connect an external antenna. (Details on page 12)

FM/AM Mode Selector Switch ⑯

When listening to an FM broadcast or TV sound, set it to the FM position or to the AM position for AM broadcasts. This switch has no effect on VHF4 and VHF5 since their modes are automatically set to FM, nor on LW, MW, MB and SW since they are already set to the AM mode.

AFC Switch ⑮

This switch should usually be set to the ON position.

The AFC (Automatic Frequency Control) affords easy tuning and prevents frequency shift while maintaining stable reception. However, when there are strong signals from a broadcast in the neighborhood of a weak signal, the unit will select the stronger signal, and it will be difficult to tune in a weak signal. In such a case, set this switch to the OFF position.

This switch will function when listening to FM broadcasts with the band width selector switch ⑭ set at the WIDE position. If the band width selector switch ⑭ is set at the NARROW position, or when listening to AM broadcasts, this switch has no effect.

Squelch Control ⑩

Should usually be set to the OFF position. However, when there is inter-station noise during tuning or when the transmission on an amateur band stops (causing an increase in the noise level), turn this knob to the right to eliminate the noise. This control functions for FM broadcasts, but not for AM broadcasts.

Note: Do not turn the control too far, or the broadcast sound cannot be heard.

Band Width Selector Switch ⑭

Set at the NARROW position when interfering signals occur to reduce the interference and stabilize reception. It has no effect on VHF4 and VHF5 since they are always at the WIDE position.

Notes on Single-Sideband (SSB) and Continuous Waves (CW) Reception

VHF Telescopic Antennas ②

Frame Antenna ③

Adjust the VHF telescopic antennas for broadcasts of SSB or CW on VHF or the frame antenna for SSB or CW on Short Waves. If reception conditions are unfavorable, connect an external antenna. (Details on page 12 and page 19)

How to Receive SSB and CW Signals

• SSB and CW on Short Wave Bands (SW)

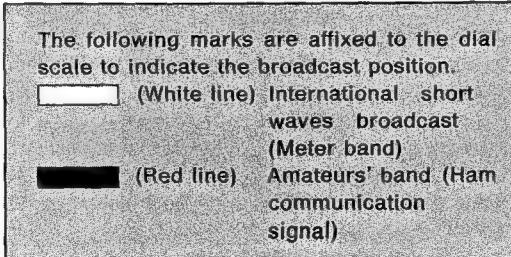
- 1) Adjust the pointer of the BFO control ⑩ to the mark (•) on the panel.
- 2) Turn the MGC control ⑪ to the HIGH position.
- 3) Turn the tuning control ⑫ slowly until either the unclear SSB sound or the CW "peep" sound are at a maximum.
- 4) Set the AM/SSB-CW mode selector switch ⑦ to the SSB-CW position.
- 5) Turn the BFO control ⑩ to the right or to the left (USB or LSB).
 - For SSB, the transmitted human voice will be distinct.
 - For CW, a "peep" sound will be clearly heard.
- 6) Set the band width selector switch ⑬ to the NARROW position to eliminate interference. If interference remains, or if the sound is distorted, turn the MGC control ⑪ to the left.
- 7) When turning the MGC control ⑪ counter-clockwise, the volume will be reduced a little and may be adjusted with the volume control ⑪.

- 8) Repeat steps 3) and 5) through 7) in order to be able to listen to a clear sound.

• SSB and CW on Very High Frequency Bands (VHF)

- 1) Set the FM/AM mode selector switch ⑩ to the AM position.
- 2) Set the band width selector switch ⑬ to the NARROW position.
- 3) Follow the same procedure as in SSB and CW on SW.

Note: If you leave the AM/SSB-CW mode selector switch ⑦ on SSB-CW position when not actually listening to a SSB or CW broadcast, the oscillating tone will be mixed with tuned-in signal and listening will be difficult.

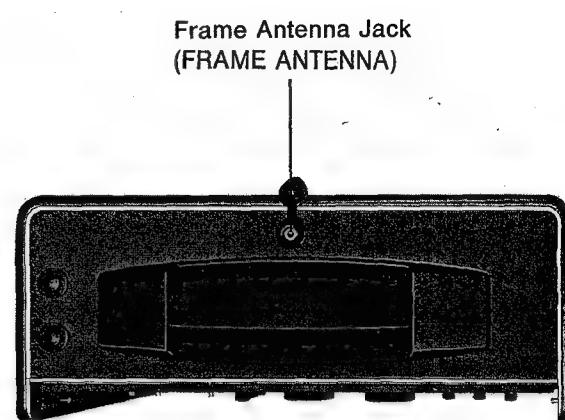
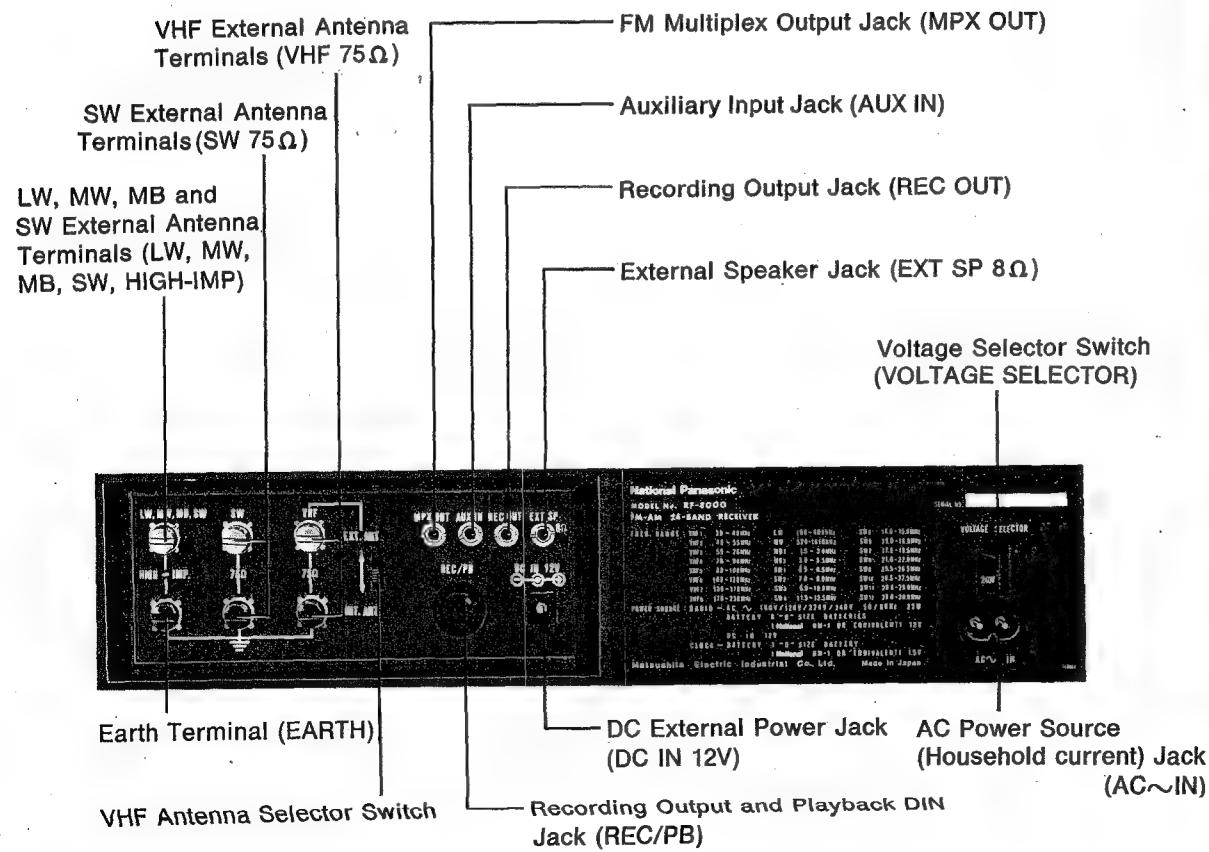


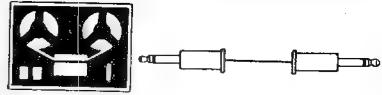
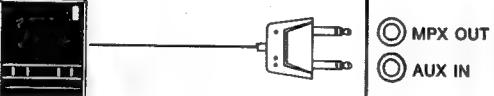
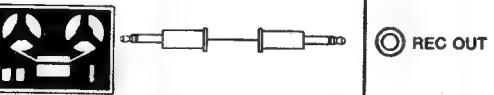
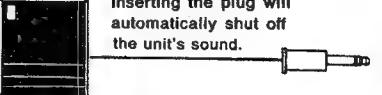
Listening to TV Sound

This unit can receive the sound of any TV broadcast due to total coverage of its VHF bands. This coverage includes foreign TV and FM broadcasts, and the procedure is the same as for regular VHF and FM reception. However, the TV sound of some countries is broadcasted on AM. Therefore, the procedure for listening to AM on VHF should be followed.

E

Jacks and Their Connections



Usage	Accessories	Connection method	Connection jack	Usage	Accessories	Connection method	Connection jack
For using AC current	Power source cord (Supplied)	Insert into the AC outlet	AC~IN	To playback	Tape recorder		AUX IN
For using car battery	Car battery adaptor	Insert into cigarette lighter socket.	DC IN 12V - +	To record or playback through DIN jack	Tape recorder		REC/PB
For listening through earphone	Earphone (Supplied)	When the plug is inserted, the radio sound is automatically shut off. Listening with headphones at the same time is also possible. When not in use, place in the earphone pocket inside the battery compartment.	EARPHONE (Imp. 8Ω)	To cut the radio sound during playback, insert plug (RJP3-1).			AUX IN
For listening through headphone	Headphone	When the plug is inserted, the radio sound is automatically shut off. Listening with earphone at the same time is also possible.	HEADPHONES	<p>Note 1: During recording, the volume control has no effect since the output level of the unit is fixed. Note 2: During recording, the unit functions as a monitor. Note 3: If a strange sound (such as a peep or a hum) should be heard while play-back or recording is being made with this unit connected to a tape deck by only a connecting cord which has two DIN type plugs at both the ends, insert the supplied plug into the AUX IN jack.</p>			
To listen to stereo FM broadcast	FM stereo adaptor		MPX OUT AUX IN	To listen to records.	Record player		AUX IN
		Note: The stereo adaptor functions during FM broadcasts, but not during AM broadcasts.		To use rhythm machine	Rhythm machine		AUX IN
To record	Tape recorder		REC OUT	To use external speaker	External speaker		EXT SP(8Ω)

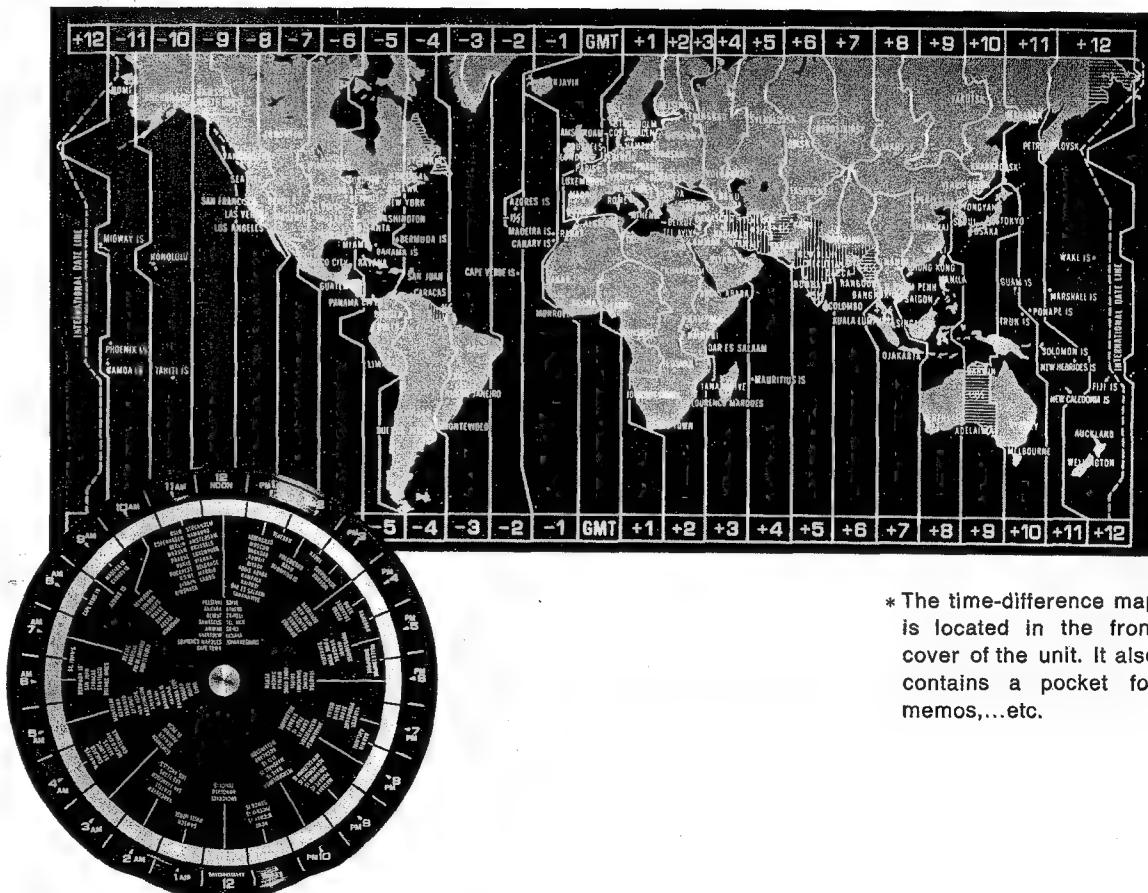
Finding the Time in any Part of the World

You can find the local time of the main cities with the world time-difference map and the world time conversion plate supplied with this unit. Use the following procedure.

- 1) Find the time difference of your city on the time-difference map.
- 2) Rotate the circular plate of the world time conversion plate until the time in your city coincides with the time difference.
- 3) Read the time difference of the city which you want to know about on the time-difference map and find out the time which corresponds to the time difference on the world time conversion plate (limited to 12 hours). This time is the local time of the city whose time you want to know. In cases of cities which are not shown in the time map, roughly determine their position on the map and then find out the time difference.

Note: In summer, take note of the countries which adopt a summer daylight savings time.

Your City	Time in Your City	Time in Other Cities
London (GMT)	10 A.M.	Tokyo...7 P.M. New York...5 A.M.
New York	10 A.M.	Vancouver...7 A.M. Hong Kong...11 P.M.
Tokyo	10 A.M.	Paris...2 A.M. New York 8 P.M. (previous day)



* The time-difference map is located in the front cover of the unit. It also contains a pocket for memos,...etc.

Reception's Contents of Each Band

This unit offers full broadcasting frequency coverage from 150 kHz to 230 MHz. You can receive signals as shown in the table below.

	Received frequency range	LW broadcast	MW broadcast	FM broadcast	Aircraft band	Beacon	Amateur band	TV sound
VHF1	30~40 MHz							
VHF2	40~55 MHz							
VHF3	55~76 MHz			○			6m band (50~54 MHz)	○
VHF4	76~90 MHz							○
VHF5	88~108 MHz			○				○
VHF6	108~136 MHz				○			
VHF7	136~178 MHz						2m band (144~148 MHz)	○
VHF8	176~230 MHz							○
LW	150~400 kHz	○				○		
MW	520~1610 kHz		○					

	Received frequency range	Short Wave broadcast band	Amateur band	Citizen band	Standard frequency
MB1	1.5~ 3.0 MHz	120m band (2.3~2.495 MHz)	160m band (1.8~ 2.0 MHz)		2.5 MHz
MB2	3.0~ 5.5 MHz	90m band (3.2~3.4 MHz) 75m band (3.9~4.0 MHz) 60m band (4.75~5.06 MHz)	80m band (3.5~3.9 MHz)		5.0 MHz
SW1	5.5~ 6.5 MHz	49m band (5.95~6.2 MHz)			
SW2	7.0~ 8.0 MHz	41m band (7.1~7.3 MHz)	40m band (7.0~7.1 MHz)		
SW3	9.0~10.0 MHz	31m band (9.5~9.775 MHz)			10.0 MHz
SW4	11.5~12.5 MHz	25m band (11.7~11.975 MHz)			
SW5	14.0~15.0 MHz		20m band (14.0~14.35 MHz)		15.0 MHz
SW6	15.0~16.0 MHz	19m band (15.1~15.45 MHz)			15.0 MHz
SW7	17.5~18.5 MHz	16m band (17.7~17.9 MHz)			
SW8	21.0~22.0 MHz	13m band (21.45~21.75 MHz)	15m band (21.0~21.45 MHz)		
SW9	25.5~26.5 MHz	11m band (25.6~26.1 MHz)			
SW10	26.5~27.5 MHz			○	
SW11	28.0~29.0 MHz		10m band (28.0~29.0 MHz)		
SW12	29.0~30.0 MHz		10m band (29.0~29.7 MHz)		

Note: In different countries, the frequency range may differ.

Proper Procedure for Listening to Short Wave Broadcasts

Receiving short wave signals is not difficult if proper procedure is followed.

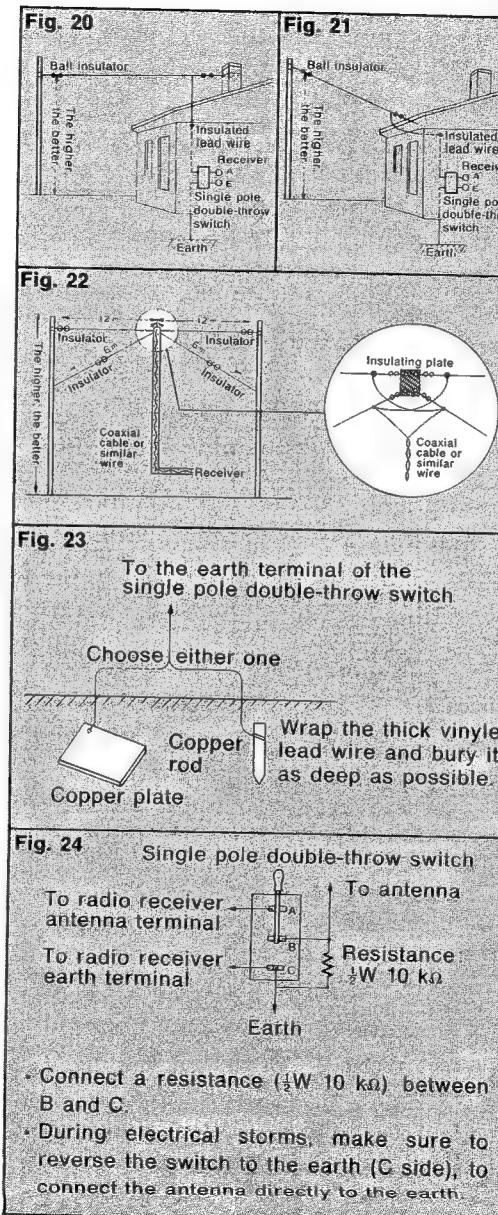
Radio stations usually broadcast LW, MW, SW and Very High Frequency waves (FM, VHF). FM and MW are used for local, relatively short distance broadcasts, while SW is used for broadcasting over long distances (foreign broadcasting, amateurs, and ships or aircraft communication). Short wave offers the pleasure of listening to foreign news faster and the uniqueness of foreign folk music.

1 How to Extend the Antenna and How to Fix the Earth

To receive signals on LW, MW, MB and SW bands the built-in ferrite core antennas and the frame antenna are sufficient. However, when the distance is great or the signal is weak (especially with SW) it is necessary to rig an external antenna and a ground lead as shown in Fig. 20~Fig. 23. The antenna should be as high as possible and far from noise generating machines and high tension cables.

(You can also connect a high impedance antenna to the 75Ω external antenna terminal in the unit).

To avoid danger due to lightning, attach a safety device. As shown in Fig. 24, fix a single pole double-throw switch as near to the service entrance of the antenna lead as possible. During electrical storms, make sure to connect the antenna directly to the earth by reversing the switch to the earth side.



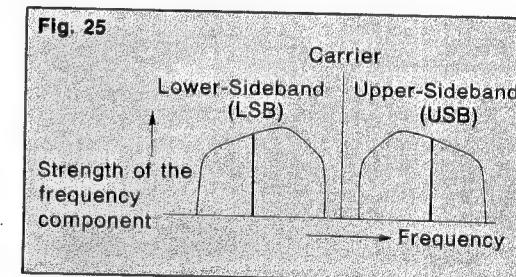
2 Single-Sideband (SSB) and Continuous Waves (CW)

Single-Sideband (SSB)

In general, SSB corresponds to a modulated wave in the AM Double-Sideband (DSB) signal. It is used for business purposes, amateur wireless, and it can be regarded as a special type of AM wave. Features:

- 1 In case of transmitting: All information is transmitted with a little energy and band width.
- 2 In case of receiving: Since there is no carrier, it is necessary to use a special detection method.

AM (DSB) waves can be illustrated in a spectrum as in Fig. 25.



There is an electromagnetic wave (carrier) with two sidebands transmitted as a single group in an AM form. High frequency waves are contained in the Upper-Sideband (USB) while the lower frequency waves are in the Lower-Sideband (LSB).

Voice and other information are contained in the sidebands but are not included in the carrier; thus the carrier is not always necessary, and other methods for transmitting the information are considered.

One of these methods is SSB. Either the USB signal or the LSB signal is transmitted and it depends upon individual customs. Usually for amateur communication, LSB is used under 10 MHz and USB used over 10 MHz. SSB waves are generated by passing the AM wave through a

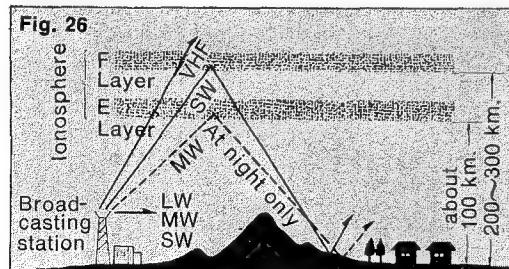
band-pass filter, then selecting either USB or LSB and sending the signal through the transmitting antenna. In receiving SSB (USB or LSB) waves on an ordinary AM receiver, it would not be possible to hear a transmitted voice unless a special alteration was made at the detection stage; either to construct the carrier and detect the AM after adding the SSB or to use the switching method (product detection) on the frequency of the carrier for the SSB. The latter method has less distortion, and it is used in this unit.

Continuous Waves (CW)

In practice, it is used to transmit Morse code signals by intermitting the carrier, but it is difficult to hear the sound even after AM detection. Using the detection circuit of the SSB, the intermittent sound can be heard by product-detecting the carrier and by varying the frequency a little.

3 Propagation of the Electromagnetic Wave

Electromagnetic waves of a SW broadcast are separated into surface waves which are propagated along the surface of the earth and space waves which are propagated upwards. Low frequency waves (LW & MW) are surface waves, while high frequency waves (SW) are bounced off the ionosphere which is located 100~300 km above the earth's surface. It is charged and acts like a mirror toward electromagnetic waves. That is why high frequency waves can be received over great distances. On the other hand, the electromagnetic waves of higher frequencies (VHF) protrude through the ionosphere and can only be used for short distances.



The ionosphere is thought to have been made by the ultra-violet rays of the sun, and consequently, the conditions of the ionosphere change from time to time due to the position of the sun. Seasonal variations also occur. Since it is multi-layered, the path of propagation of electromagnetic waves is extremely complex.

In particular, the number of solar spots changes every 11 years, and this change affects the shape of the propagation. In receiving SW broadcast, one must keep all of the foregoing in mind. The best known SW stations take all of the factors into consideration and change the frequency from season to season or broadcast with two or more different frequencies at the same time, so that the most suitable reception can be achieved.

4 Features of the Meter Bands and Amateur Bands

• Meter Bands

120m Band (2.3~2.495 MHz)

90m Band (3.2~3.4 MHz)

These two bands are for sole use in tropical regions where unusual electrical activity and other noises occur which make MW reception impractical. They are used mainly for local broadcasting. In comparison with MW, they are rather difficult to receive because of noise or intermitting signals.

75m Band (3.9~4.0 MHz)

This band is used for short distance broadcasting in tropical regions.

60m Band (4.75~5.06 MHz)

This band is like the 120m and 90m bands and is used chiefly for local broadcasts in tropical regions.

49m Band (5.95~6.2 MHz)

This band is mainly used for short and medium distance international broadcasts and local broadcasts. Depending on the season, and since international broadcasts use this frequency instead of high frequencies, it is possible to receive broadcasts from many countries.

E 41m Band (7.1~7.3 MHz)

The propagation of this wave is similar to that of the 49m band. It is chiefly used for medium to short distance broadcasting.

31m Band (9.5~9.775 MHz)

Heavily used for international as well as local broadcasts. Short Wave broadcasts of different countries are contained in this band, and if receiving conditions are favorable, it is possible to receive many stations at every 5 kHz.

25m Band (11.7~11.975 MHz)

The propagation of this wave is similar to that of the 31m band, and follows the 31m band in popularity because many international broadcasting stations with strong output use this band throughout the year.

19m Band (15.1~15.45 MHz)

It is chiefly used by international broadcasting stations and is regarded as the "Main band." From this band to the higher frequency bands, reception becomes difficult with the decrease in the number of solar spots.

16m Band (17.7~17.9 MHz)

It is used by international stations for purposes similar to the 19m band, but because it is greatly affected by any slight change in the solar spots and in different seasons, it is often impossible to receive it. If received at all, it would be surprisingly similar to a strong signal.

13m Band (21.45~21.75 MHz)

This band is used for long distance international broadcasts. It is used regardless of the seasons when the solar spots are active. Sensitivity of this band changes from time to time.

11m Band (25.6~26.1 MHz)

This band is used for long distance international broadcasts during the time of heavy activity in the solar spots. Like the 13m band, its sensitivity changes from time to time. When the conditions are good, reception is easy as there is neither noise nor interfering signals.

E**• Amateur Bands****160m Band (1.8 MHz)**

This band is also called the "Top band", and among amateur bands it has the longest wavelength. Though it is good for short distance transmissions, many ham fans prefer DX communication on it.

80m Band (3.5 MHz)

This band is generally used for short distant broadcast. However, depending on the season and time, it can be used for DX traffic communications.

40m Band (7 MHz)

When the activity of the solar spots is at a minimum, this band is most efficient for DX communications. However, its allotted band width is narrow and it is susceptible to interfering signals.

20m Band (14 MHz)

Also called the "Amateurs' main band". Its listening area changes with the time and the season. It can be used as a world-wide traffic communication band, and it is usually possible to receive broadcasts from every country.

15m Band (21 MHz)

When the solar spots decrease, DX station and traffic communication signals are difficult to receive. When the spots are active, it is possible to receive low-power DX stations as surprisingly strong signals.

10m Band (28 MHz)

Among amateur bands, it is the one with the higher frequency (HF). This band has both HF and VHF characteristics, and has more features than 15m band; when the solar spots are active, you can tune-in very distant DX stations.

6m Band (50 MHz)

This is one of the highest frequencies in the amateur bands, and one of the lowest in the VHF bands. It is mainly used for surface wave communication purposes: CW, SSB, AM, FM etc..

2m Band (144 MHz)

Used mainly for mobile FM or for short distance communication signals, and also used for SSB in some countries.

Like VHF signals, this band's signals propagate directly and are reflectable.

1.5m Band (220 MHz)

A very few countries allot this band for amateur use. In the U.S.A., most mobile broadcasting stations use this band, and the quality of the wave is similar to that of the 144 MHz band.

5 Verification Card

Short wave broadcasting stations usually issue a verification card for listener's reception reports. At the same time, broadcasting time tables and various pamphlets are supplied to listeners, making it easy to plan a reception schedule and noting changes in frequencies, etc.. To get a verification card, a correct reception report should be sent to the broadcasting station. The method of writing a reception report is as follows.

Using the broadcast country's language is most desirable, however English can usually be used, and the report (see page 22) should be written in simple sentences. Make sure to write all of the information useful to the station. When filing, the following items are the minimum requirement.

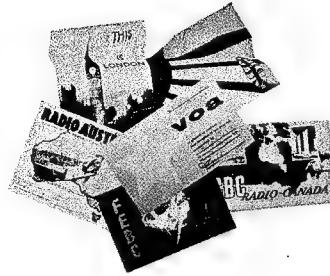
1. Name of the station.
2. Date and time of reception (GMT indication).
3. Frequency.
4. Signal receiving conditions. The conditions can be expressed in numbers by referring to the SINPO code shown in the following table. However, it is also advisable to explain them in writing.
5. Reception area and your name and address.
6. Reception equipment: Type of radio, antennas, etc..

Send this information to the broadcasting station. If you send the report frequently to the same station, that station will return information regarding frequency and program changes to enable you to program your time for up-to-date reception.

You may find that only the name of the country and the city of the station are announced over the air, so if you don't receive the verification card, keep sending reports until you do. Of course, you can send to as many stations as you wish. The cards sent from various countries show local landscape and culture which enrich your knowledge of foreign lands, and will also increase your enjoyment of listening to the radio broadcasts.

⟨SINPO TABLE⟩

	Signal Strength	Interference	Noise	Propagation Disturbance	Overall Rating
	S	I	N	P	O
5	Very strong	None	None	None	Excellent
4	Strong	Faint	Faint	Faint	Good
3	Medium	Medium	Medium	Medium	Fair
2	Weak	Strong	Strong	Strong	Poor
1	Faint	Very strong	Very strong	Very strong	Unusable



(SAMPLE REPORT)

	Your Address Your Name Date																		
<p>Radio Japan Tokyo Japan</p> <p>Gentlemen:</p> <p>I heard you on Mar. 10th, 1975, from 1500 until 1600 GMT on approximate 15255kHz.</p> <p>Received programs and receiving conditions were as following:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">TIME (GMT)</td> <td style="width: 10%;">PROGRAMS</td> <td></td> </tr> <tr> <td>1500</td> <td>Opening announcement in Japanese & English (by male announcer)</td> <td></td> </tr> <tr> <td>1502-1515</td> <td>News in English (by male announcer)</td> <td></td> </tr> <tr> <td>1515-1530</td> <td>News commentary (by male announcer)</td> <td></td> </tr> <tr> <td>1530-1558</td> <td>Folkmusic</td> <td></td> </tr> <tr> <td>1558-1600</td> <td>Closing announcement in Japanese (by female announcer)</td> <td></td> </tr> </table> <p>SIGNAL STRENGTH: (6) good INTERFERENCE: (4) slight (telegram) NOISE: (5) nil</p> <p>PROPAGATION DISTURBANCE: (5) nil OVERALL RATING: (4) good</p> <p>RECEIVER: National Panasonic Radio Model RF-8000 (11 Band FM-AM-SSB-CW Receiver)</p> <p>ANTENNA: Single-wire, 12m long 8m high.</p> <p>Please send me your verification, if this report is correct.</p> <p style="text-align: center;">Thanking in advance Yours truly, <u>Your Name</u></p>		TIME (GMT)	PROGRAMS		1500	Opening announcement in Japanese & English (by male announcer)		1502-1515	News in English (by male announcer)		1515-1530	News commentary (by male announcer)		1530-1558	Folkmusic		1558-1600	Closing announcement in Japanese (by female announcer)	
TIME (GMT)	PROGRAMS																		
1500	Opening announcement in Japanese & English (by male announcer)																		
1502-1515	News in English (by male announcer)																		
1515-1530	News commentary (by male announcer)																		
1530-1558	Folkmusic																		
1558-1600	Closing announcement in Japanese (by female announcer)																		

Greenwich Mean Time (GMT)

Almost all international broadcasts express time according to GMT. This unit contains a world time-difference map and a world time conversion plate for use in converting GMT to local time. (Details on page 17)

6 Q-Abbreviations for Telegraph and Voice Communication

To simplify communication signals' contents, Q-signals have been predetermined and fixed for international use. They are primarily used among amateur wireless operators. The most widely used Q-signals are listed below.

E

Abbreviation	Question	Answer
QRA	What is your station? -----	This is ... station.
QRB	How far is your station from mine? -----	About ... nautical miles (or kilometers).
QRG	What is my correct frequency (or the correct frequency of...)? -----	Your correct frequency is ... kHz (or the correct frequency of ...MHz).
QRH	Is my frequency changing? -----	Your frequency is changing.
QRK	What is the degree of clarity of ... code? -----	1...Poor 2...Very poor 3...Fairly good 4...Very good 5...Excellent
QRM	How is your reception? -----	1...No interference 2...Little interference 3...Medium interference 4...Strong interference 5...Extreme interference
QRN	What are your static noise conditions? -----	1...None 2...Little 3...Medium 4...Strong 5...Extreme
QRO	Shall I increase the power of my transmitter? -----	Please increase the power of your transmitter.
QRP	Shall I decrease the power of my transmitter? -----	Please decrease the power of your transmitter.
QRQ	Shall I transmit faster? -----	Please transmit faster (... words/min.)
QRU	Have you finished automatic decoder preparations? -----	Automatic decoder preparations are finished.
QRV	Shall I transmit slower? -----	Please transmit at speed of ... words/min.
QRX	Shall I stop transmission? -----	Please transmit slower.
QRU	Are you transmitting to me? -----	Please stop transmission.
QRV	Are you ready? -----	I am not transmitting to you.
QRX	What time will you call me again? -----	I am ready.
QRZ	Who is calling me? -----	I will call again at ... o'clock (... kHz or ... MHz).
QSA	How strong is ... code? -----	... is calling you (... kHz or ... MHz). ... code is: 1...Imperceptible 2...Weak 3...Good 4...Very strong 5...Extremely strong
QSB	Is my code fading? -----	Your code is fading.
QSD	Is my keying incorrect? -----	Your keying is incorrect.
QSL	Will you send a verification card? -----	I will send a verification card.
QSO	Can you communicate directly (or through relay) with...? -----	I can communicate directly (or through relay) with... .
QSP	Can you relay to ... free of charge? -----	I will relay to ... free of charge.
QSY	Shall I change to another frequency for transmission and reception? -----	Please change to ... kHz or ... MHz for transmission and reception.
QTH	What is the latitude and longitude of your position? -----	My position is ... latitude and ... longitude (or other means of indication).
QTR	What is the correct time? -----	The correct time is ... o'clock.

E

7 Abbreviations and Codes for Telegraph

Telegraph abbreviations and codes are fixed by international wireless communication rules for easy, simple transmission.

Morse code is used by telegraph companies and radio hams and the following abbreviations and codes are used very often.

Abb. or code	Meaning
<u>AR</u>	Finished transmission (- - - - transmitted as one code).
<u>AS</u>	Please wait (- - - - transmitted as one code).
<u>BK</u>	Used to stop continued communication.
<u>CFM</u>	Please confirm (I will confirm)
<u>CL</u>	Will close the station.
<u>CQ</u>	Calling all stations.
<u>DE</u>	From ... (the call letters of the calling station).
<u>K</u>	Please transmit.
<u>NIL</u>	I have nothing to transmit to you.
<u>NO</u>	No.
<u>NW</u>	Now.
<u>OK</u>	I agree.
<u>R</u>	Received.
<u>REF</u>	Refer to
<u>RPT</u>	Please repeat (I will repeat).
<u>SOS</u>	Emergency signal (- - - - - transmitted as one signal).
<u>VA</u>	Finished communication (- - - - - transmitted as one signal).
<u>YES</u>	Yes.
<u>VVV</u>	Adjustment code.
<u>HH</u>	Correction cord (- - - - - transmitted as one signal).

8 Alphabet Code

Alphabet code is used for spelling and for abbreviations. The international wireless communication rules for spelling are fixed in order to assure correct messages.

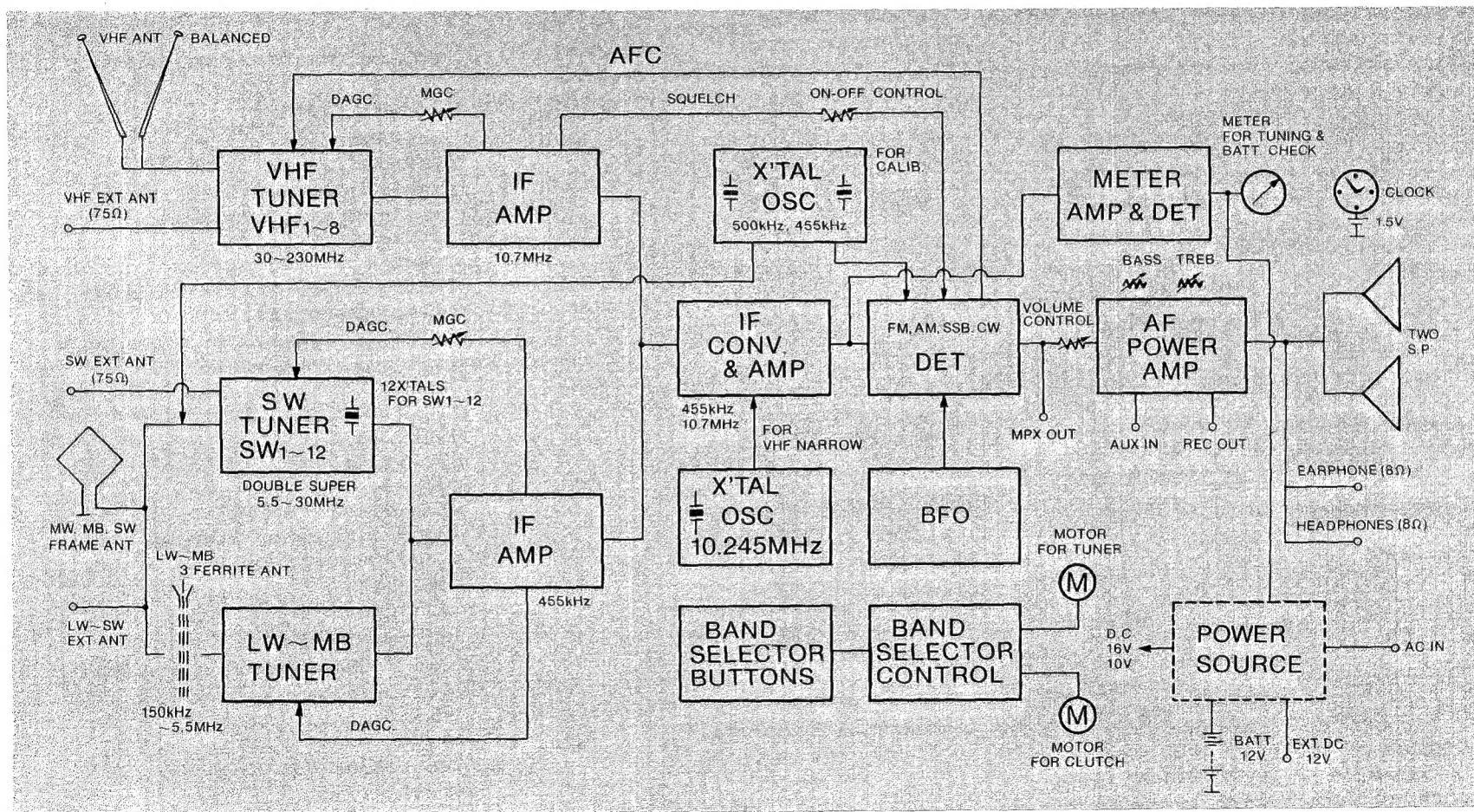
Alphabetical letter	Fixed word for spelling
A	Alfa
B	Bravo
C	Charlie
D	Delta
E	Echo
F	Foxtrot
G	Golf
H	Hotel
I	India
J	Juliette
K	Kilo
L	Lima
M	Mike
N	November
O	Oscar
P	Papa
Q	Quebec
R	Romeo
S	Sierra
T	Tango
U	Uniform
V	Victor
W	Whisky
X	X-Ray
Y	Yankee
Z	Zulu

9 Morse Code

During telegraph communications, the fixed transmitted letter is sent in Morse code. This code is used by both communication companies and radio hams.

Fixed transmitted letter or code	Morse Code	Fixed transmitted letter or code	Morse Code
A	-	1	- - - -
B	- - -	2	- - - -
C	- - - -	3	- - - -
D	- - - - -	4	- - - - -
E	.	5
F	- - - - - -	6	- - - - - -
G	- - - - - - -	7	- - - - - - -
H	8	- - - - - - - -
I	..	9	- - - - - - - - -
J	- - - - ..	0	- - - - - - - - - -
K	- - ..	,	- - - - - - - - - - -
L	- - - ..	?	- - - - - - - - - - -
M	- - - - ..	(- - - - - - - - - - - -
N	- - - - - ..)	- - - - - - - - - - - - -
O	- - - - - - ..	:	- - - - - - - - - - - - - -
P	- - - - - - - ..	=	- - - - - - - - - - - - - - -
Q	- - - - - - - - ..	Correc-	- - - - - - - - - - - - - - - -
R	- - - - - - - - - ..	Under-	- - - - - - - - - - - - - - - - -
S	- - - - - - - - - - ..	stand-	- - - - - - - - - - - - - - - - - -
T	- - - - - - - - - - - ..	able	- - - - - - - - - - - - - - - - - - -
U	- - - - - - - - - - - - ..	Start-	- - - - - - - - - - - - - - - - - - - -
V	- - - - - - - - - - - - - ..	ing	- -
W	- - - - - - - - - - - - - - ..	Code	- -
X	- - - - - - - - - - - - - - - ..		- -
Y	- - - - - - - - - - - - - - - - ..		- -
Z	- - - - - - - - - - - - - - - - - ..		- -

Block Diagram



Specifications

- **Operation Method**

FM-AM-SSB-CW Super-Heterodyne Receiver.
Crystal-Controlled Double Super-Heterodyne System (VHF1~VHF8 Narrow, SW1~SW12).
Electronic Control, 2-Motor Drive System for Bands Selection Mechanism.

- **Power Source**

For radio: AC (Alternating Current) 50-60 Hz
100V/120V/220V/240V, 23W. DC (Direct Current) 12V, Eight "D" size batteries (National UM-1 or equivalent). Car Battery 12V (use National Panasonic Car Battery Adaptor RD-9380).

For clock: DC (Direct Current) 1.5V, One "D" size battery (National UM-1 or equivalent).

- **Reception Frequency Bands (24 Bands)**

VHF1	30~40 MHz	SW1	5.5~6.5 MHz
VHF2	40~55 MHz	SW2	7.0~8.0 MHz
VHF3	55~76 MHz	SW3	9.0~10.0 MHz
VHF4	76~90 MHz	SW4	11.5~12.5 MHz
VHF5	88~108 MHz	SW5	14.0~15.0 MHz
VHF6	108~136 MHz	SW6	15.0~16.0 MHz
VHF7	136~176 MHz	SW7	17.5~18.5 MHz
VHF8	176~230 MHz	SW8	21.0~22.0 MHz
LW	150~400 kHz	SW9	25.5~26.5 MHz
MW	520~1610 kHz	SW10	26.5~27.5 MHz
MB1	1.5~3.0 MHz	SW11	28.0~29.0 MHz
MB2	3.0~5.5 MHz	SW12	29.0~30.0 MHz

- **Antennas**

VHF1~VHF8: 2 Telescopic Antennas 1306mm (51 $\frac{7}{16}$ "") 8 steps, 75 Ω External Antenna (Unbalanced).

LW, MW, MB1, 2: 3 Ferrite Core Antennas 12Ø ($\frac{1}{2}$ "Ø) × 200 mm (7 $\frac{7}{8}"), Frame Antenna 435 mm (17 $\frac{1}{8}$ ") × 300 mm (11 $\frac{13}{16}$ ") (Except LW, good for SW too), High Impedance External Antenna (good for SW too).$

SW1~SW12: Frame Antenna, 435mm (17 $\frac{1}{8}$ ") × 300mm(11 $\frac{13}{16}"), 75 Ω External Antenna (Unbalanced, special for SW).$

- **Sensitivity (S+N/N 6dB, Tone Control at Flat Position)**

VHF:

VHF1~VHF7	FM 0.5~1.0 μ V AM 0.7~1.5 μ V
VHF8	FM 2 μ V AM 6 μ V

LW, MW, MB, SW:

LW	70 μ V/m
MW	15 μ V/m
MB1	15 μ V/m
MB2	20 μ V/m
SW1~SW12	AM 0.5~1.0 μ V SSB 0.2~0.4 μ V

- **Image Rejection Ratio**

VHF1~VHF8	65~35 dB
LW	65 dB
MW	35 dB
MB1, MB2	30 dB
SW1~SW12	70~35 dB

- **Selectivity**

VHF:

WIDE	50 kHz (-3 dB), 300 kHz (-60 dB)
NARROW	10 kHz (-3 dB), 15 kHz (-60 dB)

LW, MW, MB, SW:

WIDE	1.7 kHz (-3 dB), 17 kHz (-60 dB)
NARROW	1.1 kHz (-3 dB), 3 kHz (-60 dB)

- **Intermediate Frequency**

VHF: WIDE 10.7 MHz, NARROW 455 kHz

LW, MW, MB: 455 kHz

SW: VIF 1.7~2.7 MHz (variable)

IF 455 kHz

- **S/N Ratio (400 Hz 30% Modulation, 100 mV Input)**

VHF: FM 63 dB
AM 55 dB

LW, MW, MB, SW: 55 dB

- **VHF FM Squelch**

Variable Level Type

- **MGC Variable Range**

VHF 30dB SW 40dB

- **BFO Variable Range**

±3.5 kHz

- **SW Frequency Correction Position**

Every 500 kHz

- **VHF AFC Width**

±500 kHz

- **Speakers**

180mm(7") × 100mm(4")

Two PM Dynamic Speakers

(Impedance: 16 Ω)

- **Clock**

12-Hour Display, DC Clock, Tuning Fork Type

- **Connection Jacks**

VHF External Antenna (75 Ω), SW External Antenna (75 Ω), LW/MW/MB/SW External Antenna, Frame Antenna, FM Multiplex Out, Auxiliary Input, REC OUT, Recording and Playback (DIN), External Speaker, Headphone, Earphone, AC Power Source (household current), DC External Power Source.

- **Dimensions of Cabinet**

Width: 512mm(20 $\frac{3}{16}$ ") Height: 361mm(14 $\frac{1}{4}$ ")

Depth: 213mm(8 $\frac{3}{8}$ ")

- **Weight:**

21.0 kg (46 lb. 5 oz.) without dry batteries.

- **Accessories**

Power Source Cord, Earphone, Frame Antenna, 3 Plugs.

